

CIRCUITS AND METHODS FOR CHARACTERIZING
RANDOM VARIATIONS IN DEVICE CHARACTERISTICS
IN SEMICONDUCTOR INTEGRATED CIRCUITS

Abstract of the Disclosure

5 Circuits and methods for measuring and characterizing
random variations in device characteristics of semiconductor
integrated circuit devices, which enable circuit designers
to accurately measure and characterize random variations in
device characteristics (such as transistor threshold voltage
10) between neighboring devices resulting from random sources
such as dopant fluctuations and line edge roughness, for
purposes of integrated circuit design and analysis. In one
aspect, a method for characterizing random variations in
device mismatch (e.g., threshold voltage mismatch) between a
15 pair of device (e.g., transistors) is performed by obtaining
subthreshold DC voltage characteristic data for the device
pair, and then determining a distribution in voltage
threshold mismatch for the device pair directly from the
corresponding subthreshold DC voltage characteristic data.
20 The voltage threshold mismatch distributions of different
device pairs of a given circuit design can then be used to
determine voltage threshold variations of the constituent
circuit devices. The voltage threshold variation of the
devices can be used to characterize the random variations of
25 the given circuit.